Turning the Tide
on runoff pollution
SC DHEC's Bureau of Water

Stormwater is managed in small, cost-effective landscape features located on each lot

Inside Spring 2003

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LID, A New Approach to Stormwater Management

- Neil Weinstein, Exec. Director, LID Center

Low Impact Development (LID) is a comprehensive technology-based approach to managing urban stormwater. This approach combines a hydrologically functional site design with pollution prevention measures to compensate for land development impacts on hydrology and water quality. Stormwater is managed in small, cost-effective landscape features located on each lot rather than being conveyed and managed in large, costly pond facilities located at the bottom of drainage areas. This unique micro-management source control concept is quite different from conventional end of pipe treatment or conservation techniques.

LID is not a growth management program. It does not rely on density restrictions or clustering. Instead, LID focuses on how the developed area of a site is planned and designed to minimize hydrologic impacts. It uses a variety of site design and pollution prevention techniques to create a hydrologically functional and environmentally sensitive landscape.

Goals and Principles of LID

The primary goal of LID is to mimic the predevelopment site hydrology by using site design techniques that store, infiltrate, evaporate, and detain runoff. Use of these techniques helps to reduce off-site runoff and ensure adequate groundwater recharge. Since every aspect of site

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An LID rain garden captures runoff from a suburban lot.

In the Field

Bioretention Cell Study Underway

- Charles Privette III, Extension Assoc.,Clemson University

Managing stormwater runoff is now more challenging than ever as regulations become stricter and urbanized areas continue to grow. Water that once infiltrated into soil now flows over mostly impervious surfaces in urban areas and washes pollutants from these surfaces into nearby streams and lakes. Enter bioretention cells (BRCs), a relatively new, but promising method of managing stormwater runoff. BRCs work by capturing runoff as sheet flow and directing it to prepared beds and ponding areas for infiltration and evaporation. BRCs also treat runoff because surface vegetation takes up nutrients, and chemically and biologically active organic material in the BRCs absorbs other pollutants.

This pilot BRC project, funded by the US Forest Service and conducted by a multi-disciplinary team of researchers from Clemson University, will evaluate the use of bioretention cells to manage both the quantity and quality of stormwater runoff and the use of processed forest biomass (chipped on-site logging debris) as the source of organic material for them. In previous designs, bioretention cells have had a top layer of mulch, a middle layer of soil, and a sand-gravel layer on the bottom that removes excess water and keeps the soil aerobic. However, their capacity to remove nitrogen has not always been adequate. To improve denitrification, the bioretention cell in this project will include a layer of processed forest biomass between the soil and rock layers.

The bioretention cell project will be located at the DANA Corporation's new facility at the Orangeburg City and County Industrial Park where it will collect and treat stormwater runoff from the shipping-receiving lot. Biosystem engineers will use water quality samples to estimate pollutant removal efficiencies. They will also measure rainfall, inflow, and outflow to develop a model that determines minimum size of cells to meet environmental performance criteria. An economist will analyze the conditions under which BRCs are a cost-effective, better management practice.

This project also involves participation from the Cooperative Extension Service of Clemson University, South Carolina Forestry Commission, University of South Carolina, Engineering Resources Corporation, Orangeburg County Development Commission, Orangeburg City and County Industrial Park Commission, and Pattillo Construction Co. Project results will be presented in a future issue of *Turning the Tide*.

For additional information, contact Charles Privette at privett @clemson.edu or (864) 656-6247.

Rock Hill Chooses SRF Loan to Fund NPS Projects

- Chris Costner, Rock Hill Stormwater Manager

Rock Hill, a city situated about 25 miles south of Charlotte, has an area of almost thirty-two square miles and an urban population of about fifty-two thousand. About six years ago, the City Council established a Stormwater Division under the Utility Department, which is funded by a stormwater fee that is imposed on city residences and businesses. The division has a budget of over one million dollars, which goes for operation and maintenance and professional services.

Back in July 2000, Council requested the Stormwater Division to come up with at least $5 million dollars worth of capital projects for water quality improvement. In turn, the Division proposed six projects estimated to cost $7.5 million. To finance these projects, the Division compared general obligation bonds, increasing stormwater fees, and various grants. About that time, while attending a SC Association of Stormwater Managers meeting, the Division first heard about the State Revolving Fund (SRF) as a long-term funding source. The SRF had many advantages such as a very favorable interest rate and no payback until construction is completed, fitting the Division's needs. Compared to general

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Watershed Minute

FERC Relicensing in the Catawba and Yadkin-Pee Dee

The Federal Energy Regulatory Commission (FERC) is the agency that licenses, inspects, and oversees environmental matters related to most hydroelectric (hydro) projects. FERC licenses, which regulate the design and operation of those projects, are issued for a term of 30 to 50 years. The relicensing process typically begins 5 years before the current license expiration date and involves the applicant providing information to state and federal resource and regulatory agencies, and other interested parties. During this process, environmental issues such as water quality, minimum flow releases from dams and endangered species are addressed.

In the Catawba watershed, Duke Power operates 13 hydro facilities and 11 reservoirs on the Catawba River in North and South Carolina. Seven of these facilities and 5 reservoirs are located in South Carolina. All these facilities are regulated through a single license, which expires in 2008. Duke Power has initiated the relicensing process by submitting a consultation package.

In the Yadkin – Pee Dee watershed, Alcoa Power Generating, Inc. and Progress Energy Carolina have licenses which will expire in 2008. Alcoa operates 4 hydro facilities on 4 reservoirs on the Yadkin River in North Carolina. Progress Energy operates 2 hydro facilities on 2 reservoirs on the Pee Dee River in North Carolina. Both companies have initiated the relicensing process. SCDHEC will provide comments to the applicants and regulators in North Carolina addressing the quality and quantity of water entering South Carolina in the Pee Dee River downstream of these facilities.

For more information see *www.ferc.fed.us/hydro/docs/origin.htm.*

- Mark Giffin, SCDHEC

News to Use

SC Forestry Commission Urban and Community Forestry Grant Funds Available

The SC Forestry Commission, in cooperation with the U.S. Forest Service, is pleased to announce that funds have been appropriated for the 2003 Urban and Community Forestry (U&CF) Grant Assistance Program.

This is a reimbursable, matching grant program to provide funding for projects designed to improve the management, conservation and maintenance of the tree resource in and around South Carolina communities. Eligible entities include: local government (including counties, municipalities, cities, and towns), 501(c)3 non-profit organizations, educational institutions, and state agencies.

In accordance with the SC Urban and Community Forestry Five Year Strategic Plan, the 2003 Grant Assistance Program has four main focus areas: 1) Community forestry program development, 2) Community forestry program improvement and enhancement, 3) Information and educational training, and 4) Environmental organization development. Projects that incorporate partnerships with: agencies, non-profit organizations and/or the private sector; incorporate multi-cultural awareness and/or volunteer participation will receive greater consideration by the review committee.

Applications must be received by 5:00 p.m. on April 18, 2003 at the SC Forestry Commission's Columbia office. Funded projects must be completed between June 1, 2003 and July 31, 2004. For more information contact: Gloria H. Freeman, U&CF Grant Assistance Program S.C. Forestry Commission, (803) 896-8846, gfreeman@forestry.state.sc.us or, *www.state.sc.us/forest/urban.*

The South Carolina Clear Water Contractor Program

- Frank López, DHEC-OCRM & Cal Sawyer, South Carolina Sea Grant Extension Program

Construction and land disturbing activities have the potential to adversely affect water quality in South Carolina waterways. Sediment and soil erosion impacts are an altogether too common type of nonpoint source pollution and can be particularly troublesome in rapidly developing areas. The South Carolina Stormwater Management and Sediment Reduction Act of 1991 (SMSR) governs most land disturbing activities in our state. While the SMSR has undoubtedly improved sediment and erosion control planning, the on-site installation and maintenance of sediment and erosion control practices such as silt fencing, rock check dams, and inlet protection is where "the rubber meets the road" in protecting waters from sediment impacts.

Through a partnership of DHEC's Office of Ocean and Coastal Resource Management, the South Carolina Sea Grant Consortium, and Clemson Extension, a program about the proper installation, siting, and maintenance of sediment and erosion control practices is being launched. The South Carolina Clear Water Contractor Workshop (SC CWC), which will debut in Greenville on March 20, brings sediment and erosion control information and education to those persons who have the most direct influence on sediment and soil erosion impact reduction: general contractors, paving and grading contractors, bulldozer operators, excavators and others involved in land disturbance.

Upon completion of the one-day course, which includes a final exam, each "graduating" attendee will attain the status of a South Carolina Clear Water Contractor, and be allowed to use the program's logo to demonstrate their commitment to quality site development and South Carolina's waterways. Following the initial SC CWC in Greenville, which is sponsored by the Greenville Soil and Water Conservation District, the program will expand across the state thanks to the involvement of South Carolina's Sea Grant Consortium and Clemson Extension.

... the workshop brings ... information and education to those persons who have the most direct influence on sediment and soil erosion impact reduction

For more information, or to check on future SC CWC dates and locations please contact Frank López, OCRM Certification Compliance Specialist at (843) 747-4323, ext. 139, lopezfm@ dhec.sc.gov, or Birdie Crosby, Clemson Extension Service at (843) 832-0135, or bcrosby@ clemson.edu.

LID

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development affects the hydrologic response of the site, LID control techniques focus mainly on site hydrology.

Some of the main goals and principles of LID:

• Provide an improved technology for environmental protection of receiving waters.
• Encourage public education and participation in environmental protection.
• Reduce construction and maintenance costs of the stormwater infrastructure.
• Introduce new concepts, technologies, and objectives for stormwater management such as micromanagement and multi-functional landscape features (bioretention areas, swales, and conservation areas); mimic or replicate hydrologic functions; and maintain the ecological/biological integrity of receiving streams.

Additional Information

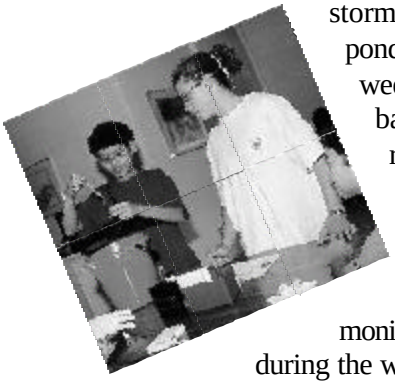
The *Low Impact Development Design Strategies* manual was developed to provide a reference and a model for practitioners to use in experimenting with and applying LID techniques across the nation. Download the manual at *ftp://lowimpactdevelopment.org/pub/LID_National_Manual.pdf* or contact, Neil Weinstein, Executive Director, Low Impact Development Center nweinstein@lowimpact development.org, (301) 982-5559.

This article was adapted with permission from ***Low Impact Development Design Strategies: An Integrated Design Approach*** manual.

Ashborough Adventurers Making a Splash

The Ashborough Adventurers know that water quality begins in their own backyard. This 4-H group studies their neighborhood stormwater pond in Summerville. The detention pond, Ashborough Lake, drains to the Ashley River. Assisted by their leader, Clemson Extension Agent Debbie Elek, this group monitors temperature, dissolved oxygen, and pH in the pond.

For six weeks last summer, the Adventurers monitored the stormwater pond on a weekly basis. Just recently they have been out to monitor during the winter season. The 4-Hers have also surveyed aquatic macroinvertebrates in the pond.



These 4-H youths understand the effect that runoff pollution has on water. Actions such as washing cars, and improper use of fertilizers or pesticides can harm water quality. They will be creating a brochure to hand out to the neighborhood. The brochure will tell about the pond and how residents can protect the water quality of the pond. Positive action for the health of the pond will protect the river too.

The 4-Hers have concluded that their stormwater pond is in good shape. They were even able to reassure neighborhood residents of the pond's good health during a duckweed bloom. The Ashborough community newsletter mentioned their monitoring activities and that they had not seen any major change in the factors they were monitoring.

The Ashborough Adventurers have combined two great activities, monitoring and education. They are learning and then sharing what they know about water quality. Keep up the good work!

- Lynne LaSalle, Water Watch Coor., SCDHEC

South Carolina DHEC's WaterWatch

Watershed Center Leader Wins Environmental Award

Congratulations to Dr. Jack A. Turner who received the 2002 South Carolina Environmental Awareness Award from Gov. Mark Sanford, February 26. Turner was honored for developing an environmental education outreach center for Spartanburg County.

Dr. Turner's vision of providing an educational outreach program to enhance the environmental education of the young people and community in Spartanburg County led to the creation of the Watershed Ecology Center at the University of South Carolina at Spartanburg in 1999. The center collects, analyzes and disseminates sound scientific information on the watershed ecology of the region.

The South Carolina Environmental Awareness Award, was established by the S.C. General Assembly to recognize outstanding contributions made toward the protection, conservation and improvement of South Carolina's natural resources.

Rock Hill's SRF Loan

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obligation bonds, the SRF was more economical when water quality BMPs (Best Management Practices) were included in the costs. With EPA's NPDES Phase II Stormwater Permits on the horizon, the SRF was a great way for the City to start looking at water quality requirements while completing major drainage improvements.

Subsequently, Rock Hill has applied for three separate SRF loans to do stream restoration projects in three small watersheds within the city limits. The Little Dutchman Creek project will implement stream restoration techniques (streambank stabilization, riparian buffers, and bio-engineering) on 4,200 feet of the stream at a cost of more than $350,000. The Ebinport Road project will use stream restoration techniques along with other water quality BMPs such as water quality ponds, stormwater filters, and porous pavers in a parking lot on 1465 feet of stream at a cost of $2.24 million. And the Sumter Avenue project will provide stream restoration, water quality BMPs, and stormwater drainage improvements on 5,100 feet of stream at a cost of $1.7 million.

The loans were approved by DHEC and the Budget and Control Board in the summer of 2002, and Rock Hill has begun construction on the projects. Rock Hill is the first governmental entity to take advantage of the SRF funds for NPS projects in the southeast.

For more information about this project, contact Chris Costner, Rock Hill Stormwater Manager, at (803) 329-5614 . For SRF loan information, contact DHEC's David Price at (803) 898-3993.

Coming Events

* Building With Trees Seminar, April 8, 2003, Greensboro, NC. Call 888-448-7337 or see arborday.org/bwtseminar

* The North American Surface Water Quality Conference & Exposition, July 28-31, 2003, San Antonio, TX. See: www.StormCon.com

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